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Introduction

- Sensorimotor adaptation to speech motor training induces changes in speech perception^{1,2}.
- Since speech perception and production are closely linked, speech perceptual training may also affect speech production.
- Repetitive exposure to speech based somatosensory inputs paired with auditory inputs during speech perceptual training modulates speech perception³.
- **Hypothesis:** Exposure to paired auditory-somatosensory stimulation would induce a change in speech production.

Aim

- To examine whether speech perception training with orofacial somatosensory stimulation modifies speech production.

Methods

- Twenty-eight French native speakers participated. 14 for SOMA group and 14 for CTRL group.



- Speech production performance was compared before and after training (i.e. pre- vs. post-test).

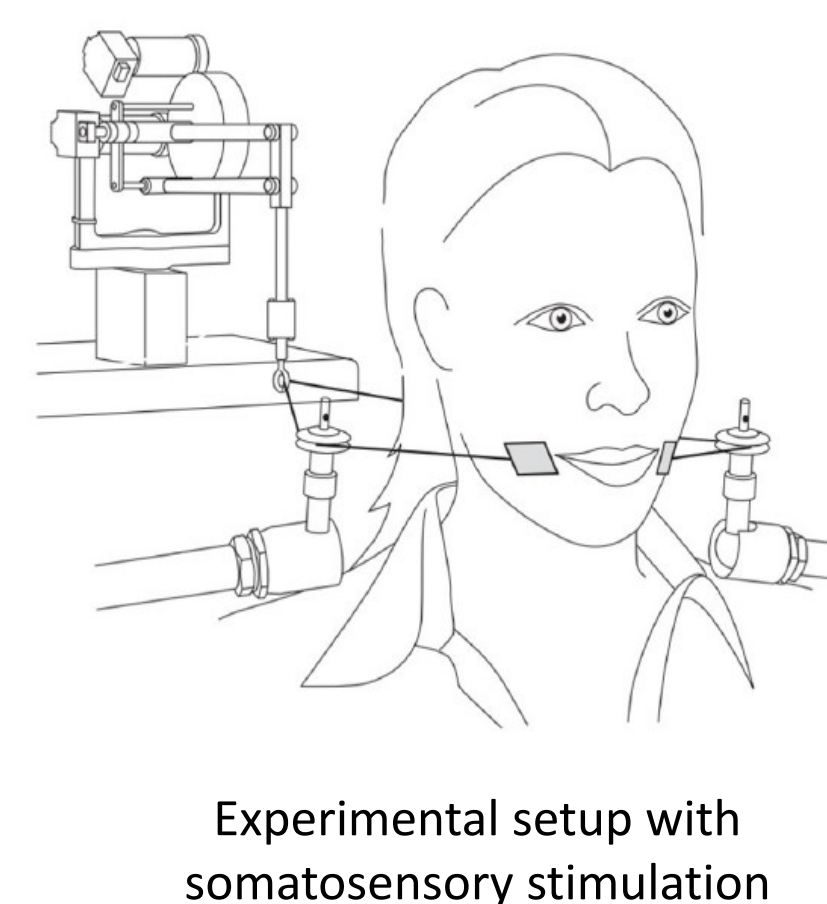
Speech Production Test

- French words, 'dé' for /e/ and 'deux' for /ø/ were recorded 10 times in each test.
- F1, F2 and F3 were compared between pre- and post-tests.

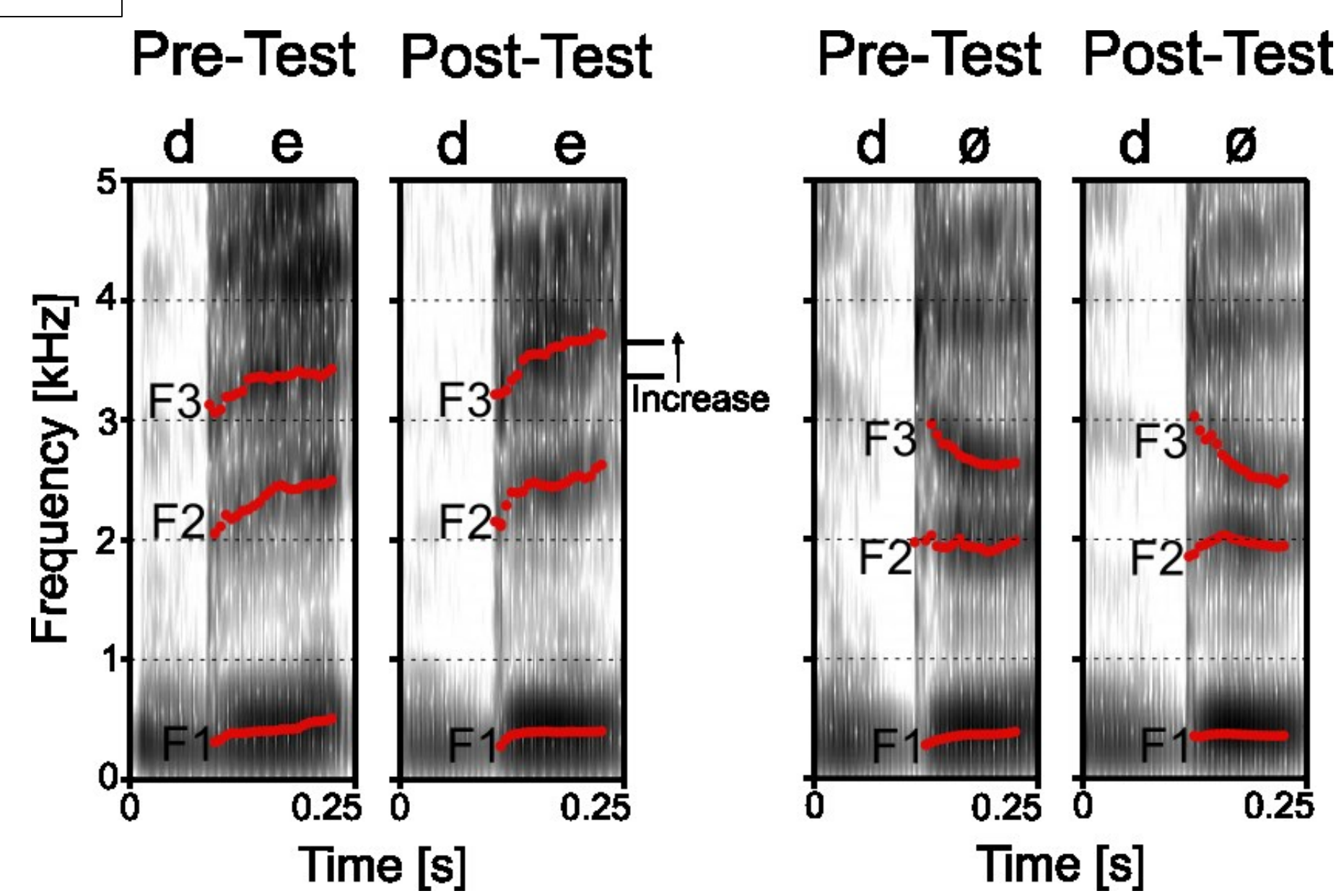


Speech Perception Training with Somatosensory stimulation

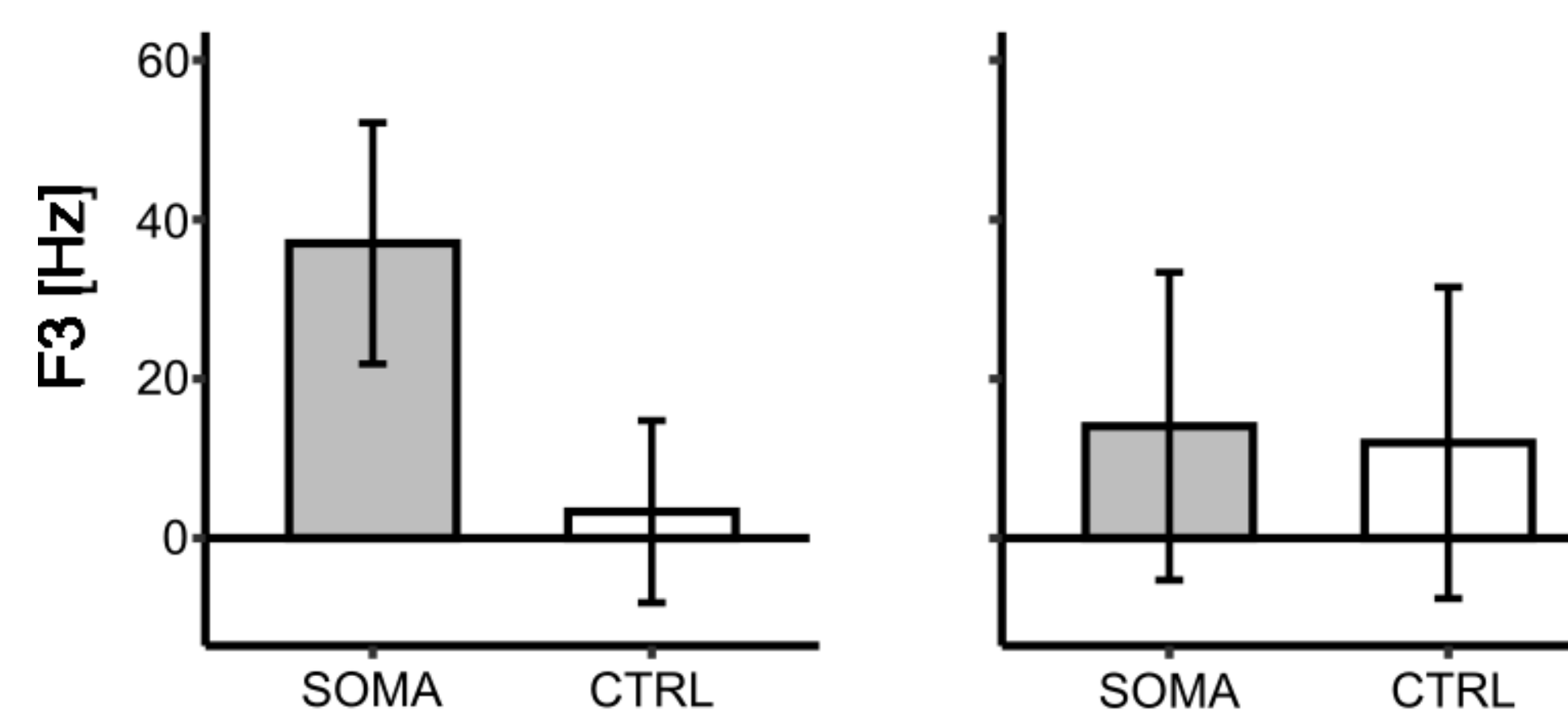
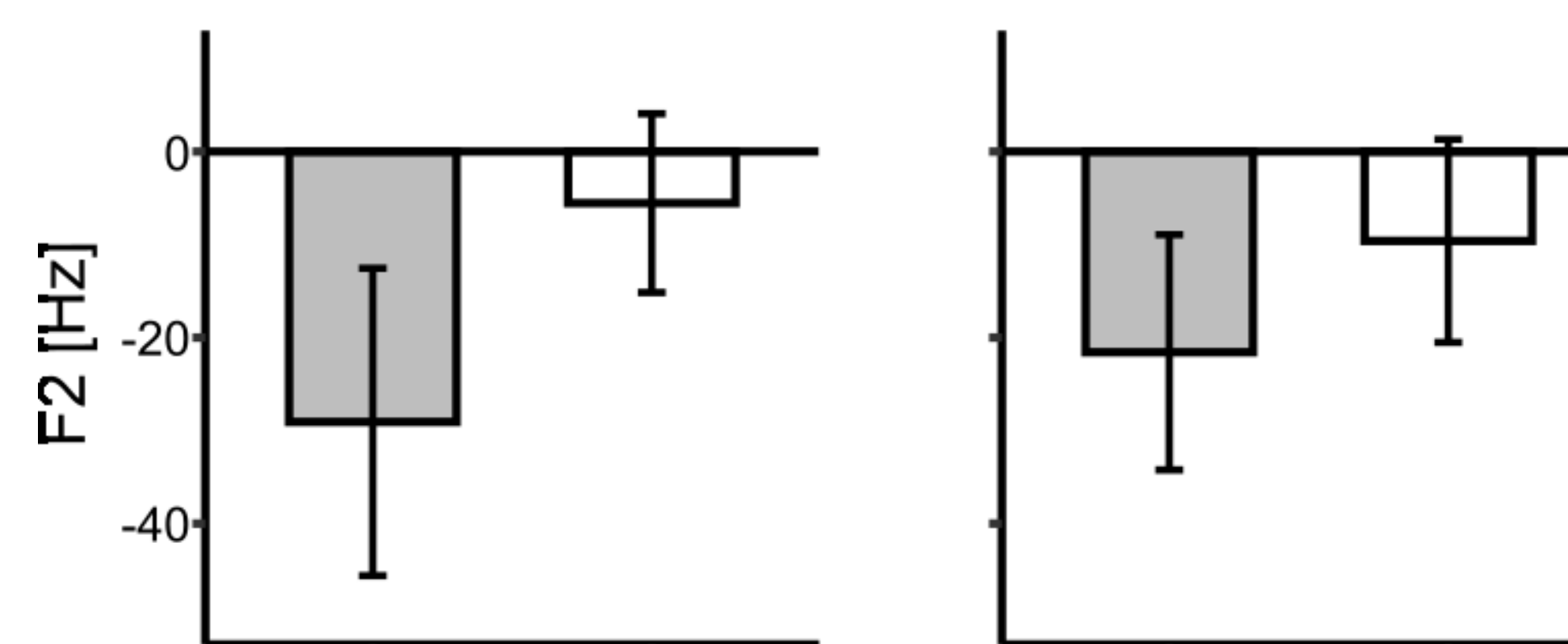
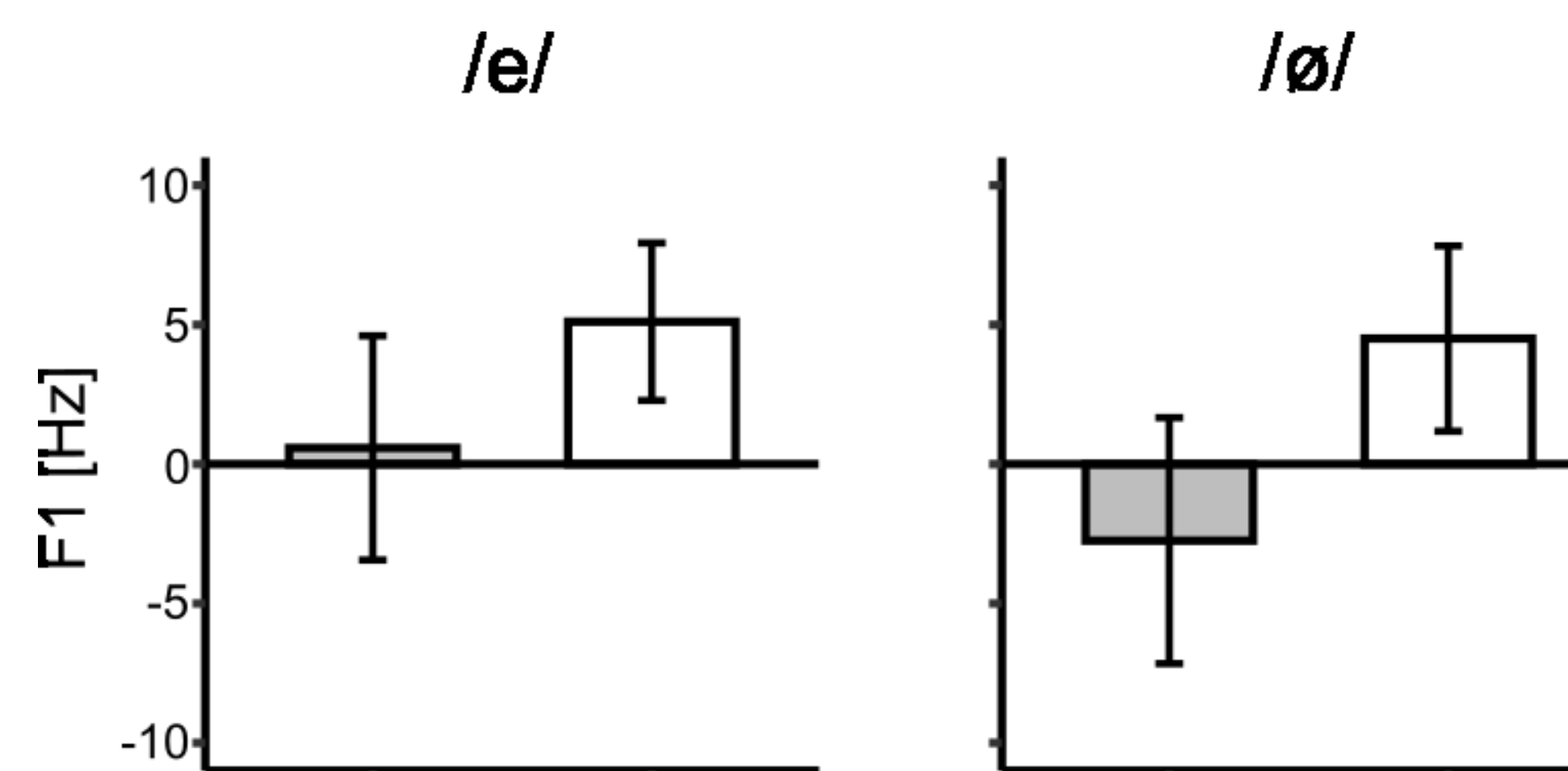
- Vowel identification test using /e/-/ø/ continuum.
- **SOMA group:** Backward facial skin-stretch applied by a robotic device when the stimulus sound was presented.
- **CTRL group:** Same training but without somatosensory stimulation.



Results



Representative Spectrogram of the words "dé" and "deux" in pre- and post-test

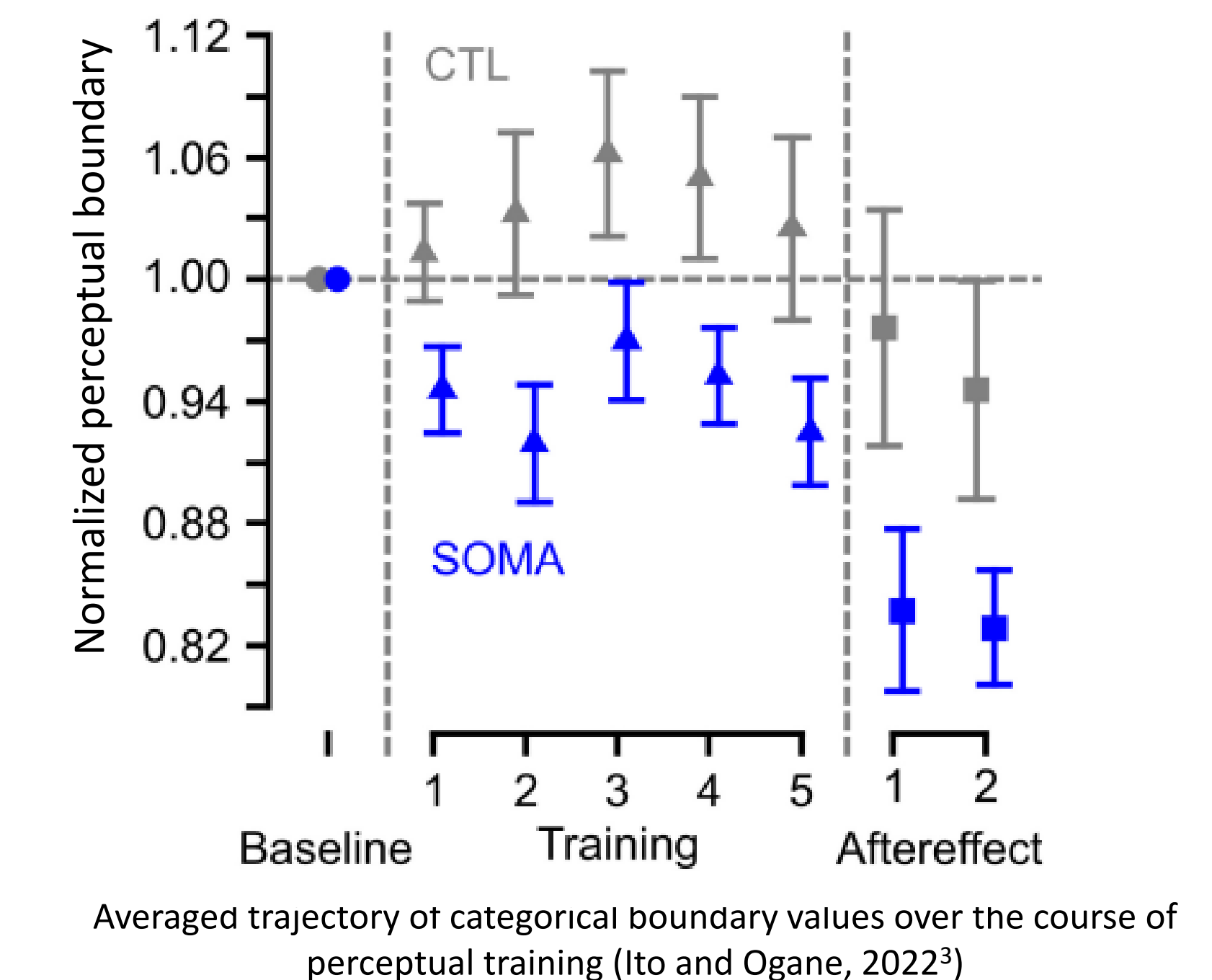


Difference in F1, F2 and F3 for both vowels between pre- and post-test.

- F1 and F2 of vowels /e/ and /ø/ were not significantly changed between pre- and post-test in both groups.
- F3 of the vowel /e/ in the post-training was increased in SOMA ($t(13) = 2.44, p < 0.05$), but not in CTRL ($t(13) = 0.29, p = 0.77$), while there were no significant difference for F3 in /ø/ in both groups.

Discussion

- We found that F3 of /e/ increased following perceptual training with orofacial somatosensory inputs.
- Participants probably increased lipspreading after perceptual training with somatosensory input.
- Ito and Ogane (2022)³ showed that orofacial somatosensory inputs in speech perceptual training results in a categorical boundary shift during speech perception.



- Hence, perceptual training with somatosensory inputs may also result in changes in production, in line with a link between production and perception.

Conclusion

- Repetitive exposure to paired auditory-somatosensory stimulation resulted in a change in speech production performance after training.
- The results suggest that somatosensory inputs play an important role in speech learning.

Acknowledgements

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